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ABSTRACT

Researchers and educators involved in designing programs of vocabulary instruction must take a more realistic view of the task they face and realize that vocabulary instruction has limitations. First among these limitations is the sheer size of the task. Teaching the meanings of new words one at a time cannot possibly ensure the volume of vocabulary growth necessary for normal progress in reading, nor can it be seen as a solution to the massive vocabulary problems facing many students. A second limitation is that much vocabulary instruction has been found not to increase reading comprehension measurably, and a third is the failure to take into account the heterogeneity of English vocabulary and to adapt instructional methods to different types of words. Recognition of the limitations of vocabulary instruction makes it necessary to reevaluate the goals of such instruction, and the criteria for what constitutes the most effective approach to it. A primary goal for any vocabulary program must be to foster independent word learning, which necessarily involves a large volume of reading. (Author/FL)

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Technical Report No. 326

LIMITATIONS OF VOCABULARY INSTRUCTION

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Abstract

Researchers and educators involved in designing programs of vocabulary instruction must take a much more realistic view of the size and the nature of the task they face. This paper outlines some of the limitations of vocabulary instruction. The first has to do with the sheer size of the task: Teaching the meanings of new words one at a time cannot possibly ensure the volume of vocabulary growth necessary for normal progress in reading, nor can it be seen as a solution to the massive vocabulary problems facing many students. A second limitation is that much vocabulary instruction has been found not to increase reading comprehension measurably. A third limitation is failure to take into account the heterogeneity of English vocabulary, and to adapt instructional methods to different types of words. Recognition of the limitations of vocabulary instruction makes it necessary to re-evaluate the goals of such instruction, and the criteria for what constitutes the most effective approach to vocabulary instruction. It is argued that a primary goal for any vocabulary program must be to foster independent word learning, which necessarily involves a large volume of reading.

Limitations of Vocabulary Instruction

Most vocabulary instruction consists of teaching students the meanings of individual words. Much vocabulary research has likewise been devoted to finding out what methods will best enable students to learn and remember the meanings of a given (usually small) set of words. However, the position taken here is that such attention to small numbers of individual words is often a nonproductive use of instructional time, and a much too narrow focus for research on vocabulary instruction.

We do not want to minimize the importance of having a good vocabulary, or the magnitude of the vocabulary problems facing some students. Nor would we propose that nothing be done to help students increase the size of their vocabularies. On the contrary, we hold that effective aids to vocabulary growth must be found and implemented in the schools. What is in question is the effectiveness of teaching words one at a time.

We would not argue that children should never be instructed on the meanings of individual words. Certainly there are contexts in which this can be valuable and effective. However, in this paper we do argue that there are serious limitations on a strictly word-by-word approach to vocabulary instruction. First of all, such an approach cannot possibly ensure the volume of vocabulary growth necessary for normal progress in reading, nor can it be seen as <u>the</u> solution to the massive vocabulary problems

facing many students. A second type of limitation is the frequent failure of instruction on word meanings to produce any measurable gains in the comprehension of text containing the instructed words. A third limitation is the heterogeneity of vocabulary; different types of words may require quite different instructional methods. Recognizing these limitations is a crucial step in defining the right goals and finding the most effective methods for vocabulary instruction.

Limitation: Number of Words

One of the strongest arguments against teaching new word meanings one at a time is simply that there are too many words to cover this way.

It is hardly controversial that there are too many words in the language to be dealt with one at a time in any form of vocabulary instruction. Nagy and Anderson (1984) analysed the word stock of printed school materials for grades three through nine, based on the word lists and analyses in Carroll, Davies, and Richman's Word Frequency Book (1971). They found that printed school English contains about 88,500 distinct word families,[1] with upwards of 100,000 distinct meanings. If materials for higher grade levels and for adults were included, these figures would be substantially higher.

Unknown words encountered in reading. What part of this large number of words does a person actually encounter in reading? Unfortunately, there is little information available on

the number of unfamiliar words students find in text. However, additional analyses of data reported in part in Anderson and Freebody (1983) indicate that even with relatively little reading (500,000 words a year, or less than 3,000 words per school day), an average student in fifth grade would encounter almost 10,000 different words a year which he or she did not know, even by a lenient criterion of word knowledge. For a student with a smaller-than-average vocabulary, the number of unfamiliar words would be even higher.

Yearly vocabulary growth. Not only do students encounter a large number of words, they also seem to learn many of them, judging from estimates of growth in absolute vocabulary size that occurs during the school years.[2]

Published estimates of children's vocabulary size vary widely for several reasons (cf. Lorge & Chall, 1963). One is the estimate used for the total word stock of the language. Tests purporting to give absolute vocabulary size generally adopt a dictionary or some other corpus as representing the word stock of the language, and test children's knowledge of what is intended to be a representative sample. The estimate of the word stock of the language depends both on the size of the dictionary or corpus used, and on the definition of "word" adopted (e.g., whether pairs such as discern and discernment or glum and glumly are to be counted as one word or two). The analysis of word-relatedness in Nagy and Anderson (1984) gives a basis for recalibrating some

earlier estimates of vocabulary size to correct for this latter source of difference. Recalibrations of some published estimates of average vocabulary size at grades 3 and 12 are given in Table 1. In all but one case, our recalibrated figures are higher than the original estimates, because the methods used to sample English vocabulary underestimated the total word stock of English.

Insert Table 1 about here.

The recalibrated figures in Table 1 give good reason to believe that the average high school senior's vocabulary is in the neighborhood of 40,000 words. Such vocabulary size estimates imply a tremendous volume of word learning, around 3,000 words per year during the school years. This astounding rate of vocabulary growth by average children sets a mark against which the contribution of any program of vocabulary instruction must be measured.

Individual and socio-economic differences in vocabulary size. The rapid vocabulary growth of most children occurs largely apart from, or above and beyond, any instruction specifically devoted to vocabulary learning (see the next section). This suggests that such instruction may be largely superfluous for these children. But what about children who are not learning words at this rate?

According to figures reported by M. K. Smith (1941), for all grades from 4 through 12 there is about a 6,000-word gap between the 25th and 50th percentile child. (Recalibrated according to the formula used in Table 1, the gap ranges between 4,500 and 5,400 words.) The distance between the median and the bottom of the range is more than twice that large. There are also very large differences in vocabulary size associated with socio-economic status (SES). Templin (1957) found the difference in means between her upper-SES and lower-SES subjects to be about 5,300 words by age 9. (The recalibrated figure would be 4,700 words.) Graves, Brunetti, and Slater (1982) estimated that middle-class first grade students knew 50% more words than did disadvantaged first graders.

The magnitude of these gaps poses a profound problem for any attempt to deal with vocabulary deficiencies by teaching words one at a time. The task of bringing a low-vocabulary student up to average could easily involve teaching over 4,000 words, not to mention the need for keeping up with the yearly progress of the average students.

The Contribution of Vocabulary Instruction

Given that children are learning 3,000 words or more per year, how much of this growth could be attributed to specific instruction in vocabulary? We want to look at this question both in terms of current instructional practice, and in terms of what

could be accomplished by an optimal, yet realistic, approach to vocabulary instruction.

Words listed for instruction in basals. To obtain the number of vocabulary words specifically listed for teaching in a basal reading program, we conducted a limited survey using basals from several series for grades three through six. Using the teacher's manual, we counted each word listed to be taught directly for every lesson. Results are presented in Table 2. In summary, the number of words listed to be taught in a year ranges between 290 and 460.

Insert Table 2 about here.

How do these estimates translate into numbers of new words learned through vocabulary instruction? The number of words actually learned specifically through instruction is likely to be lower than the figures in Table 2 for two reasons. First, observational studies by Durkin (1979) and Roser & Juel (1982) have shown that very little instruction in vocabulary occurs in classrooms. Durkin found that out of 4469 minutes of reading instruction, only 19 (i.e., 0.4%) went to vocabulary instruction. Roser and Juel observed 1.67 minutes per lesson devoted to vocabulary instruction with range of zero to 12 minutes; the mode was zero. Thus, it is unlikely that all words listed for instruction are actually taught.

Second, Gates (1962) and Roser and Juel (1982) have found that students already understand and can read many of the words listed as "new" in their basals. Roser and Juel found overall that students in grades 3, 4, and 5 knew 72% of the five to ten "new" words listed to be taught for a basal lesson. Even the low reading groups in Roser and Juel's study knew 48% of the "new" words. Thus, the number of words listed for instruction not already known by the students would be in the range of 110-175, or 160-240 for the lower reading group.

Given these figures, instruction specifically devoted to vocabulary in a basal program might account for a gain of a hundred or so words during a school year.

Vocabulary learning in the content areas. How much additional vocabulary learning might be attributable to instruction specifically devoted to vocabulary in the content areas? No study has been conducted estimating the number of new words taught directly during science or social studies; but such a study may be pointless. Durkin (1979) observed no vocabulary teaching during content area lessons. Roser and Juel (1982), after having 12 teachers record any vocabulary instruction done in content areas in a three month period, have concluded that "attention to word-meaning instruction seemed minimal or missing" (p. 111). Thus, looking at the content areas adds little if anything to the amount of vocabulary growth that can be attributed to vocabulary instruction as such.

The potential of vocabulary instruction. The evidence available suggests that children are learning at best a few hundred words a year through instruction devoted specifically to vocabulary. But, assuming that existing practice falls far short of ideal, how many words could be covered if a more ideal program were implemented?

It is not possible to give a conclusive answer to this question, because there is still not enough information to determine the ideal trade-off between breadth and depth of vocabulary instruction. Some programs are very intensive, but cover a relatively small number of words. For example, Beck and her colleagues (Beck, Perfetti & McKeown, 1982; McKeown, Beck, Omanson & Perfetti, 1983) taught fourth grade students 104 words in a five month period, with 75 lessons lasting 30 minutes each. An intensive program like this could at best cover 360 words per year. Even given such an intensive program, only 78% - 86% of the instructed words were learned (depending on the number of times the word was repeated in instruction). A more streamlined version of this program with fewer instructional exposures per word (McKeown, Beck, Omanson & Pople, in review) did not increase the number of words that could be covered in a year.

At the other extreme is the instructional program described by Draper and Moeller (1971), which covered 1800 words per year in 30-minute lessons 3 days a week. Not surprisingly, they found that this proved to be too many words for fourth grade students,

although apparently not for fifth and sixth grade students. Unfortunately, Draper and Moeller do not provide any figures on how many of the instructed words were actually learned. One could safely assume that the percentage of words learned would be substantially smaller than that for the very intensive instruction used by Beck et al.

Even for an ideal program of vocabulary instruction, then, the number of words actually learned in a year will still be in the hundreds. Some programs may cover more, but there is no published evidence for an approach to vocabulary instruction that could result in the learning of over 500 words per year.

"Natural" vocabulary growth vs. instruction. How much of children's vocabulary growth can be attributed to vocabulary instruction? The average child is adding 3,000 words a year to his or her vocabulary. Perhaps 300 of these are words covered in instruction specifically aimed at word learning. Even the best possible program of vocabulary instruction would not change this picture substantially. One must conclude, then, that most children are already learning words at a phenomenal rate apart from, or above and beyond, any specific vocabulary instruction. Whatever functions such instruction might have, it could not possibly produce or match the rate of word learning already attained by average children.

This contrast between the volume of vocabulary learning that occurs during the school years and the small amount that can be

attributed to vocabulary instruction as such raises two obvious and important questions that have largely been neglected in much recent vocabulary research: How are many children learning so many words so quickly? Why do these strategies--whatever they are--fail to work for other children?

Vocabulary instruction and remediation. The numbers we have presented in themselves constitute a strong case against word-by-word vocabulary instruction for average and above-average children; any approach to vocabulary growth for them should certainly capitalize on the effective natural processes of vocabulary acquisition that are already in operation. As noted earlier, the situation for children with vocabulary problems is different; arguments about the value of vocabulary instruction must distinguish clearly between remedial programs and programs for average and above-average students. However, it must also be kept in mind that just as no known program of vocabulary instruction can match the rate of acquisition by better students, neither can any known program cope with the magnitude of the gap that exists between vocabulary-deficient and average students.

An Objection to the "Numbers" Argument

We have argued that the volume of words to be learned is so great that teaching the meanings of individual words is futile, in terms of producing any substantial gain in vocabulary size. An objection to this argument can be raised along the following lines: While the number of words in the language is extremely

large, and the number of unknown words a student encounters in reading may also be very large, the majority of such words are of such low frequency that they do not warrant specific instruction. Only words of relatively high frequency need be instructed, and the number of such words is within the scope of word-by-word instruction.

It is certainly the case that the vast majority of words in the language is of very low frequency. Of the 88,500 distinct word families estimated by Nagy and Anderson (1984) to exist in printed school English, more than 90% occur less than once in a million words of text; about half occur less than once in a billion words of text. Horn (1954) provides some figures that give a similar perspective. The 2,000 most frequent words in the language constitute 95% of the words in written text. The 4,000 most frequent words constitute 97.8% of text, and the 10,000 most frequent words make up 98.9% of text. The point is that a relatively small core vocabulary accounts for the vast majority of the words that one will actually encounter in reading.

There is certainly some sense to the suggestion that any instruction on the meanings of specific words should focus on words of relatively high frequency, and hence of greater utility. However, the skewed distribution of words by frequency does not in itself guarantee that word-by-word instruction is the most effective approach to vocabulary.

Word-by-word instruction can only cover a small sample of the words that must be learned. Certainly some samples of words will be more profitable targets for instruction than others; but finding a core vocabulary of important words is not a trivial task.

The frequency dilemma. Word frequency has two opposing relationships to the utility of teaching a word. On the one hand, frequency is directly related to the usefulness of a word; the more frequent a word, in general, the more useful it is to know. But frequency also bears an inverse relationship with utility; the more frequent a word, the more likely it is to be known already, and the less use there is in teaching it. No one has yet proposed a principled way to weight these two conflicting effects of frequency in determining which words warrant individual attention.

Horn's figures show that the utility of learning individual words drops off sharply. Once the three or four thousand most frequent words have been learned, learning an additional thousand words brings only a minute increase in the percentage of words in text that are known. This makes it clear why even large-scale attempts to teach vocabulary might not measurably increase general reading comprehension.

The dilemma is that the words most useful to teach are exactly those which are likely already to be known. Johnson, Moe and Baumann (1983) found that 1,329 out of the 1800 most frequent

words in their published wordlist were already known by 90% of third grade students. If the average third grade student has a total vocabulary of over 8,000 words (see Table 1), many students will already have learned the most frequent 4,000 words fairly early in their school careers, and will also know a substantial number of the remaining words from the most frequent 10,000 in the language. This makes a core vocabulary taken from the 4000 most frequent words useful only for early grades or remedial purposes. For older or more able students, words not already known may be of such low frequency that any word-by-word instruction would be unprofitable.

Advocates of word-by-word instruction might still argue that a certain frequency range could be found within which words would be best suited for instruction--words frequent enough to be worth teaching, but not so frequent as to be already known. However, frequency alone is not an adequate basis for choosing the small sample of words that could actually be covered in a year of vocabulary instruction. Any sample of 300-400 words from a rank-ordered freqeuncy list will include a hodgepodge of words from different subject areas, and of different levels of difficulty. For example, within a single hundred-word band of adjacent words in the rank list of Carroll, Davies and Richman's Word Frequency Book (1971) are both what seem to be quite easy words (rugs, pajamas, bump, climbs, fights, fluffy, frown, downhill) and also

some relatively difficult ones (adjacent, similarities, heritage, spiritual, distinction, prepositional, specimen).

Most importantly, proposals to teach students some core vocabulary of important words do not answer the main problem concerning numbers of words--that average students are learning words at a rate which no existing or proposed program of vocabulary instruction could hope to match. Instruction on a core vocabulary of important words might be helpful to students with very small vocabularies, but this will by no means enable them to catch up to, or keep up with, the rate of vocabulary growth by average students.

The fact that most of the words in the language are of very low frequency, and hence will be encountered only rarely, highlights the importance of teaching students strategies for dealing with unfamiliar words, rather than just teaching the meanings of specific words.

Limitation: Failure to Improve Comprehension

A second limitation of teaching individual words is the failure of many types of vocabulary instruction to achieve what we feel is a primary purpose of such instruction: improvement in reading comprehension.

Two Hypotheses about the Relationship of Vocabulary Knowledge and Reading Comprehension

Educators and educational researchers have long known that a strong correlational relationship exists between vocabulary

knowledge and reading comprehension: Children who know more words understand text better (Anderson & Freebody, 1981; Davis, 1944, 1968; Thurstone, 1946). But the causal connections underlying this correlation are not clear. The simplest explanation is that word knowledge enables reading comprehension: Knowing the meaning of the words is the necessary and sufficient condition for understanding text. This has been labeled the "instrumentalist hypothesis" by Anderson and Freebody (1981). There is obvious truth to this hypothesis, but it is also demonstrably inadequate. The clearest proof of inadequacy is the fact that many studies attempting to increase reading comprehension by teaching word meanings have failed to do so (cf. Pearson & Gallagher, 1983).

Where does the instrumentalist hypothesis break down? In several studies (e.g., Bransford & Johnson, 1972; Dooling & Lachman, 1971) texts were constructed which contain only familiar words, but are still incomprehensible without additional information. Such texts illustrate the role of something beyond vocabulary knowledge in reading comprehension.

At least some of the correlation between vocabulary knowledge and reading comprehension is due to the relationship each of these has with a third construct, background knowledge. Vocabulary knowledge--knowledge about word meanings--is both a subset of, and highly correlated with, general knowledge; a person who knows more words knows more about the world in

general. Knowledge of the subject matter of a text plays an important role in the comprehension of that text, above and beyond the effects of knowing the specific words. This account of the relationship between vocabulary size and reading comprehension has been labeled the "knowledge hypothesis" by Anderson and Freebody (1981).

The knowledge hypothesis is based on a schema-theoretic view of reading comprehension, which posits that knowledge does not consist simply of an unstructured set of individual facts, but rather of organized, interrelated structures or schemata. Knowing where a piece of information "fits in" is an indispensible part of understanding it. Determining what a word contributes to the overall meaning of a text often depends on information which is not specifically included in the definition of the word--information "beyond" or "between" the meanings of individual words. A careful look at even a good dictionary makes it clear how inadequate the information in a definition can be for the task of comprehending text. Consider the following hypothetical example:

Suppose that there is a concerned parent worried that his or her child might become prematurely sexually enlightened by reading explicit biological definitions in the school dictionary. Here are some of the relevant definitions, taken from the American Heritage School Dictionary (1977):

intercourse: the act of mating, as between male and female mammals

mate: to pair or cause to pair (a male and a female animal) and allow them to breed

breed: 1. to produce or reproduce by giving birth, hatching, etc.; produce
2. to mate so as to produce offspring
reproduce: to generate or give rise to (offspring), as a living thing.

One would search in vain for any practical information on reproduction in this dictionary. These definitions almost seem to be written in a secret code, accessible only to those with the inside knowledge. In some sense they are real-life analogues of the incomprehensible texts used by Bransford and Johnson (1972) or Dooling and Lachman (1971).

Is this just a case of lexicographic Puritanism? Probably not. This example was chosen because for these particular words adults are very aware that they possess a schema, an organized body of knowledge, not possessed by some children. Hence it is relatively easy for an adult to see what information is lacking in the definitions. In the case of other definitions, it is simply more difficult for adults to become aware of the gaps in children's knowledge. If one could see other definitions from the perspective of a child missing crucial bits of knowledge, many other equally uninformative definitions would be found.

Is this a failure of the dictionary, then? Only in the sense that every dictionary fails to be an encyclopedia. A dictionary can, and probably should, define all the terms found

in a child's content area textbooks; but it would be unrealistic to expect the dictionary to contain all the information in those texts. Definitions simply cannot include all the information about a word or concept that is necessary for the comprehension of text.

The inherent limitation on definitions is one of the reasons why vocabulary instruction often fails to increase reading comprehension. Such instruction is often based on learning definitions, and in fact, often on very abbreviated definitions or synonyms.

Knowledge-based Approaches to Vocabulary Instruction

Some vocabulary instruction, however, does increase reading comprehension. Further support for the knowledge hypothesis is found in the fact that those types of instruction that do increase reading comprehension seem to represent a knowledge-based approach to vocabulary (cf. Pearson & Gallagher, 1983). For example, Swaby (1977) found that instruction emphasizing where a new concept fits into prior knowledge was more effective than an approach based on definitions. Similarly, Kameenui, Carnine and Freschi (1982) found a technique integrating word meanings with story context superior to definition drill. The intensive vocabulary programs of Beck and her colleagues (Beck, Perfetti, & McKeown, 1982; McKeown, Beck, Omanson & Perfetti, 1983), which also succeeded in increasing comprehension of texts containing instructed words, incorporated instructional

techniques aimed at developing both a network of semantic relationships among instructed words, and ties between instructed words and prior knowledge.

If vocabulary instruction has the goal of improving reading comprehension, instruction must be "knowledge-based." Word learning cannot be equated with memorizing synonyms or short definitions. Rather, words must be treated as labels for concepts which are embedded in larger schemata. Instruction must aim at establishing rich ties between new words and prior knowledge and must present new words and concepts in the context of larger domains of knowledge. This is hardly news to some people; however, it is important to emphasize that such an approach to vocabulary is not just a better way to teach words, but apparently a necessary condition for improving reading comprehension.

The arguments presented earlier about the large number of words to be learned already present serious problems for any approach to vocabulary instruction dealing with words one at a time. The point just made about the need for knowledge-based vocabulary instruction adds a new dimension to these arguments. The knowledge-based approaches to vocabulary learning that have been tested tend to be very expensive in terms of time devoted to each word, and hence cannot cover as many words as extensive but more superficial approaches to vocabulary. For vocabulary instruction that attempts to produce the depth of word knowledge

that increases reading comprehension, it is all the more true that only a small fraction of the words to be learned can be covered through word-by-word instruction.

Limitation: Heterogeneity of Vocabulary

Another limitation of vocabulary instruction has to do with the apparent neglect in much research of the differences between various types of words, differences that may have important consequences for instruction. Given that any instruction on specific word meanings can only cover a very small sample of the words that a student must learn, the question of which words are to be instructed--and which kind of words--becomes crucial. Many studies implicitly assume that all words are essentially the same sort of entity, or that the target words chosen for the experiment are representative of the overall word stock of English. The first assumption is obviously false, and the second is usually unwarranted.

Jenkins and Dixon (1983) are among the few researchers to mention possible distinctions among word-learning situations. They note, for example, the difference between learning a new label for a familiar concept, and a new label for a new concept. Judging from the frequent use of one-word definitions, much recent research has focused on the former case. This is certainly the easier condition, so one must wonder to what extent such studies are generalizable to a wider range of word types. The optimal instructional methods for the paired-associate type

learning adequate for words such as altercation or obese will not necessarily be the most effective approach to vocabulary instruction in the content areas, where new words are more likely to represent complex new concepts embedded in a network of factual information.

Another distinction seemingly ignored in some research is the distinction between partly known and totally unfamiliar words. Dale, O'Rourke, and Bamman (1971) make the sensible suggestion that vocabulary instruction should focus on those words which students have already begun to encounter, and for which they already have some partial knowledge. However, many vocabulary studies, in an attempt to control for prior knowledge, use words which (it is hoped) few subjects are likely to know. The problem is that the most effective method for teaching totally unknown words may not be the most effective method for bringing partially known words to a deeper level of knowledge.

Some words are also intrinsically harder to learn than others. (Gentner, 1978, for example, presents a range of evidence showing that verbs are harder to learn than nouns for children in the initial stages of language acquisition.) Some words covered in vocabulary programs may be words which almost all children would eventually learn on their own anyway. On the other hand, there may be certain words which are especially unlikely to be learned by children on their own. Everyone is probably aware of certain words which they encounter fairly

frequently, but for which they still have only limited knowledge of their meanings. Word-by-word instruction might be especially profitable for words in this category.

To repeat the point, the fact that only a relatively small number of words can be instructed makes the choice of words more important than seems to have been recognized. How one teaches depends on which words are to be taught. It is premature to look for the best method of instruction before one knows what is going to be instructed.

Sources of Vocabulary Growth

The numbers argument presented earlier makes it clear that most of the large yearly vocabulary growth experienced by normal children occurs apart from any instruction specifically aimed at word learning. This fact raises important questions: Where and how does this vocabulary growth take place? What can be done to promote this kind of vocabulary growth in those students who are not making these kinds of rapid and necessary strides in word learning?

Children's vocabulary growth clearly comes from a number of sources. Some of them are outside of school, and outside of the teacher's control--the speech of parents and peers, TV, and whatever reading children may do outside of school (cf. Fielding, Wilson & Anderson, in press, for data on children's reading outside of school). Within school, a large number of words may be learned during lectures or classroom discussions, either through

direct explanation of the meaning, or from an informative context. Reading, both in and out of the classroom, is likely to be a major source of vocabulary growth.

We have already argued that the bulk of children's vocabulary growth occurs incidentally, that is, outside of situations specifically devoted to word learning. There are two complementary approaches to increasing incidental word learning: First, increasing children's ability to profit from potential word-learning situations outside of vocabulary instruction (that is, helping them become better independent word learners), and second, increasing children's opportunities to learn.

There is no shortage of suggestions as to how to make children better independent word learners. Reasonable arguments can be made for teaching affixes and the use of context clues, and for finding ways of increasing children's motivation to learn new words. All of these are undoubtedly valuable, but we are not aware of any published research demonstrating a successful method for making students into better independent word learners.

It must also be noted that methods of increasing independent word learning need not focus primarily on vocabulary. Palincsar and Brown (in press) have developed a method for teaching study skills that has significantly improved reading comprehension when implemented in classroom situations. Although the long-term effect of such intervention on vocabulary growth has not been measured, it is quite likely that large gains in comprehension,

if coupled with a sufficient volume of reading, would lead to substantial vocabulary growth. Dahl (1974) found that a hypothesis-testing technique--having second grade students predict the next word in a text--led to substantial gains on a broad range of measures related to reading comprehension. The generality of the effects of such training make it quite plausible that the benefits would also extend to the task of inferring the meanings of new words from context.

Learning from Context

While much research needs to be done to determine how one can best help students become better word learners, one can be sure to increase the volume of independent word learning by increasing the opportunities for learning. To learn more words independently, a student must encounter more new words, and for the most part, this can be accomplished by increasing the amount of reading.

Up to now, there has not been much hard evidence that learning from context is an effective method of vocabulary growth. Most contexts in natural text are simply not very informative (Beck, McKeown & McCaslin, 1983), and a number of studies seem to show that learning from context is less effective than various types of more direct vocabulary instruction (e.g., Jenkins, Pany & Schreck, 1978).

In recent studies, however, Nagy, Herman and Anderson (in press; in preparation) have found evidence that gives a new

perspective on the effectiveness of learning from context.[3] Most studies in learning from context up to now have not taken into account the fact--which has long been recognized (cf. Deighton, 1959)--that learning from context is a gradual process, proceeding in terms of small increments. Nagy et al. found that the chance of a reader learning the meaning of an unfamiliar word from context was small, but statistically robust, and fairly stable across grade, ability levels and text types. The actual probability of learning the meaning of an unfamiliar word from context is only about one in twenty. In the short run, such a level of learning compares very poorly with any method of teaching words. But if one multiplies this apparently small probability by the tens of thousands of new words that a person will encounter with even a small amount of regular reading, a large total gain results. Twenty minutes of reading per school day at a rate of 200 words per minute could enable a student to learn 500-2,000 words additional words per year, depending on the number of new words in the text.

Such figures make it clear that how learning from context compares with more direct vocabulary instruction depends entirely on the type of comparison that is made. If one asks how one can best teach the meanings of a small number of words in a short amount of time, some form of direct, word-by-word instruction will undoubtedly prove most efficient. But a more important question is how students can acquire the thousands of words per

year necessary for normal progress in reading comprehension. Word-by-word vocabulary instruction does not fare very well from this perspective. Learning from context, on the other hand, if coupled with a sufficient amount of reading, can ultimately lead to substantial gains in vocabulary size.

Any word-by-word approach to vocabulary instruction that attempts in any way to be comprehensive would consume large amounts of instructional time. There is good reason to believe that the same time spent in reading would produce not only equivalent gains in vocabulary, but also other benefits as well. Pearson and Gallagher (1983), reviewing studies that have attempted to increase reading comprehension, found that "knowledge acquired gradually over time in whatever manner appears more helpful to comprehension than knowledge acquired in a school-like context for the purpose of aiding specific passage comprehension" (p. 328). This suggests that a large volume of reading is an especially effective way of acquiring the type of background knowledge that will increase later reading comprehension.

Any word-by-word approach to vocabulary is in competition for instructional time, not only with reading, but also with instruction aimed at improving reading comprehension. Instructional programs aimed at increasing reading comprehension, such as those developed by Palincsar and Brown (in press) or Dahl (1974), which deal with vocabulary incidentally if at all, may

ultimately produce greater vocabulary gains than an equivalent amount of time spent learning the meanings of individual words.

Implications for Teaching Individual Words

We have presented a number of reasons why any comprehensive approach to vocabulary should have as its primary goal better independent word learning rather than instruction on the meanings of specific words. Does this then mean that teachers should never try to teach students the meanings of specific words? Not at all; instruction on specific word meanings is often necessary and profitable.

One reason for teaching the meanings of individual words might be to bring these words into students' active (writing or speaking) vocabularies. Because active vocabularies are substantially smaller than listening or reading vocabularies, and because a fairly high level of knowledge is necessary to use a word correctly (compared to what is required to comprehend it in text), word-by-word instruction may be especially appropriate for this purpose. For example, the intensive instruction used by Beck, Perfetti, and McKeown (1982) did in fact have the effect of producing active use of the target words by the students in the program.[4] However, this research, like other research on vocabulary instruction of which we are aware, neither had active use as an explicit goal, nor did it employ any systematic measures of active word use.

Especially in the content areas, learning specific words and their meanings is one of the chief goals of instruction. A major implication of the knowledge hypothesis is that word learning is most effective when it is embedded in the learning of some organized body of information that is tied into prior knowledge. However, the focus should be primarily on knowledge, rather than on vocabulary. If a student needs to understand or express some new concept, there is motivation to learn its label; but there cannot be much motivation to learn the label for a concept whose content or function is not yet perceived.

One must also question the applicability of some recent vocabulary research to content area vocabulary. Much research focuses on learning new words for familiar concepts, that is, words for which a synonym or short definition seems to adequately express the meaning (e.g., _altercation_ or _devour_). One cannot assume that the optimal methods for teaching such words would also be appropriate for teaching new concepts embedded in unfamiliar subject matter.

Learning new words is an integral part of learning new concepts, so there must be some sort of vocabulary instruction in content areas. However, points raised about the size of the vocabulary learning task apply here as well. The number of words and concepts that must be learned is still far beyond what can be covered in instruction. In the content areas as well as elsewhere, students must become independent learners.

Conclusion

In summary, there are a number of limitations on the effectiveness of teaching the meanings of individual words.

First, the number of words that has to be learned is simply too large. Word-by-word instruction cannot hope to match the rate of vocabulary growth already experienced by most children, nor to close the gap facing students with small vocabularies.

Second, many types of vocabulary instruction have been shown not to increase reading comprehension measurably. Those types of instruction that do increase reading comprehension, if they proceed on a word-by-word basis, are relatively time-consuming. There are other ways to spend the large amount of time that is required by an extensive word-by-word approach to vocabulary instruction (e.g., free reading, learning comprehension strategies), some of which might lead to greater ultimate gains in vocabulary, as well as to other possibly more valuable benefits such as increased reading comprehension and general knowledge.

Third, there is a frequent failure in instructional research to differentiate between different types of words when determining the relative effectiveness of different approaches to instruction.

The main consequence of these limitations is this: Despite the strong correlation between vocabulary knowledge and reading comprehension, instruction on the meanings of individual words

does not seem to be an effective means of producing general gains in reading comprehension. It is difficult enough to produce gains in the comprehension of text through instruction specifically aimed at the difficult words in the text; only intensive instruction seems able to produce any measurable effect. The sheer number of unfamiliar words in normal text, and their distribution by frequency, means that the most extensive programs of vocabulary instruction could produce only minute increments in the average number of words known per thousand words of text.

Producing a general increase in reading comprehension remains a highly desirable goal; but a frontal approach through the instruction of individual word meanings is not an effective means toward this end. There are methods which reliably produce gains in comprehension, but these deal with vocabulary only incidentally, if at all.

To be effective, vocabulary instruction has to focus on more limited or specific goals. A chief goal should be to teach strategies which will allow readers to cope with unfamiliar words, and become better independent word learners. Other attainable goals might include increasing comprehension of specific texts through intensive instruction on the meanings of a few difficult but important words, and bringing words into students' speaking or writing vocabularies. No one method of instruction will be the best for all of these goals.

Research in vocabulary instruction must evaluate methods of instruction with respect to specific goals, and also evaluate the relative importance of the different purposes of vocabulary instruction. We feel that given a limited amount of instructional time, the highest priority must be given to increasing reading comprehension and helping students add thousands of new words to their reading vocabularies every year. With these goals, vocabulary research must give top billing to the difficult but crucial task of helping students become better independent word learners. However this is done, a large volume of reading is an indispensible component of any program of independent word learning.

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Footnotes

[1] A "word family" consists of the set of words for which there is a transparent, predictable relationship in both form and meaning. For example, persecute, persecution, and persecutor would all be considered as constituting a single word family, along with regular inflections such as persecuted and persecutions. On the other hand, busy and business would be counted as belonging to two separate families, since the later word has meanings which are not predictable from the meanings of the former.

[2] In this paper, unless we specify otherwise, the term vocabulary will be used to refer to reading vocabulary, that is, words children can read and understand. In discussions of children's absolute vocabulary size, estimates are almost always based on written tests, and hence reflect reading vocabulary. Also, we see increased reading comprehension as the primary, although not the only, goal of vocabulary instruction.

When we talk about vocabulary growth, we are primarily thinking of the learning of new word meanings. At the early stages of reading, increase in reading vocabulary may consist primarily of words already in oral or listening vocabulary entering a child's reading vocabulary as his or her decoding ability expands. However, after grade 3, we believe that the vast bulk of the average student's vocabulary growth consists of the learning of new word meanings.

[3]By "learning from context" we mean inferring and remembering the meaning of a formerly unfamiliar or partially known word, using information in the surrounding text. Some studies concerned with learning from context have looked only at children's ability to deduce word meanings from context, measuring their ability to consciously infer word meanings while the text is still available. In this paper, and in the research by Nagy, Herman and Anderson, "learning from context" means the retention of new word meanings acquired incidentally during normal reading.

[4]Although intensive instruction may be the surest method of bringing any specific word into a student's writing or speaking vocabulary, learning from context is also certainly adequate in many cases to produce a level of word knowledge sufficient for active word usage. Children are not afraid to use a word they have heard even once in context. The results reported in Nagy, Herman, and Anderson (in press) also indicate that learning from context occurs at all levels of word knowledge. That is, it can bring the reader to partial knowledge of a previously unfamiliar word, or to fuller knowledge of a word previously known only partially.

Table 1

Some Estimates of Vocabulary Growth and Vocabulary Size During School Years

Author	Original Figures				Recalibrated Figures*		
	Estimated Word Stock of English	Grade 3	Grade 12	Average Annual Growth	Grade 3	Grade 12	Average Annual Growth
Dupuy (1974)	12,300	2,000	7,800	633	4,016	38,457	3,353
Brandenburg (1918)	28,000	5,429	14,975	1,061	7,705	32,290	2,732
Kirkpatrick (1891, 1907)	28,000	6,620	17,600	1,220	10,004	41,517	3,501
M. K. Smith (1941)	166,247	25,500	47,000	2,556	23,672	40,789	2,035
Cuff (1930)	35,000	7,425	21,840	1,602	9,834	42,685	3,650

*Recalibrated figures for grades 3 and 12 were arrived at by the following formula:

$$R = V * (1 + ((V/N) * ((88,533/N) - 1)))$$

where R is the revised estimate of absolute vocabulary size, V is the author's original estimate of absolute vocabulary size, N is the total word stock of the language as represented by the dictionary or corpus used by the original author, and 88,533 is the total number of distinct word families estimated to exist in printed school English by Nagy and Anderson (1984). This formula attempts to capture the fact that the size of the estimated word stock of English (N) becomes more of a limiting factor as the size of a person's vocabulary (V) increases.

Table 2

Number of Words to be Directly Taught in Three Basal Series*

Basal	Grade 3	Grade 4	Grade 5	Grade 6	Total
1984 Ginn	335	294	313	290	1232
	303**	162	104	115	684
1975 Series R Macmillan	348	382	335	431	1496
1984 Laidlaw	452	457	386	399	1694

*New vocabulary words appearing in text but not listed to be directly taught are not included.

**Enrichment words; optional to teach.